

## **REMARKS**

In response to the December 28, 2006 Office action, Applicants respond to the Examiner's detailed action with the following remarks numbered according to the Examiner's communication. Claims 13, 14, and 27-29 are pending and rejected in the application. Claims 13 and 27 are amended hereby.

Through the extensive prosecution of this application, Applicants have attempted to refine the claims to claim a method for cleaning wafers with the new and unique relationship between the motion of the wafers and the orientation of the column of megasonic energy. Applicants submit that the language now captures this new and unique relationship, which is not shown in the prior art, and that the claims are allowable over the cited references.

### **Continued Examination under 37 C.F.R. §1.114**

1. Applicants acknowledge that the Examiner has entered Applicants' amendment submitted with the request for continued examination with thanks.

### **Claim Interpretation**

2. Applicants respectfully submit that the use of the term "piezoelectric transducer" in the claims is sufficient to be clear that the claims refer to one of the transducers 42, 44 and not the transducer assembly 30 whether or not Claims 13 and 27 require only one piezoelectric transducer.

3. Although Applicants believe that it would be clear to one skilled in the art which surface is the upper surface of the transducer, Applicants have amended the claims to further define the upper surface as the surface facing the cleaning fluid.

### **Claim Rejections – 35 USC §102**

4-5. Responsive to the Examiner's rejection of Claims 13, 14, and 27 under 35 U.S.C. 102(b) as being anticipated by any one of U.S. 3,893,869 and U.S. 4,118,649 (Mayer and Schwartzman), Applicants respectfully disagree. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently

described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Neither Mayer nor Schwartzman teaches the limitations of Claims 13 and 27. Particularly, Mayer and Schwartzman do not teach that the motion of the wafers is relative to an aspect of the shape of the transducers. Nor do Mayer and Schwartzman teach a transducer having an upper surface facing the cleaning fluid with a long edge and a short edge. Applicants note that the transducers in ‘869 are circular and thus do not have a surface with a long edge and a short edge. Further, in ‘649, the transducers are either circular or hexagonal with equal edges and thus do not have a surface that faces the cleaning fluid and has a long edge and a short edge.

In contrast, the amended Claims 13 and 27 require that each transducer have “an upper surface with a long edge and a short edge, the upper surface facing the cleaning fluid or being substantially parallel with the most proximate boundary of the cleaning fluid,” and that the wafers are moved “parallel to the short edge of the upper surface of the piezoelectric transducer.” Even if one were to consider, *arguendo*, a surface of the hexagonal transducers 34 in ‘649 that does not face the cleaning fluid (as the surface that does face the cleaning fluid has equal edges), the motion of the wafers is parallel to the long edge and perpendicular to the short edge. This is opposite to what is claimed in Claims 13 and 27.

Since the Mayer and Schwartzman references do not teach all the limitations of the claims, Applicants respectfully submit that Claims 13 and 27, as well as the claims that depend therefrom, are in condition for allowance.

### **Claim Rejections – 35 USC §103**

6-7. Applicants submit that the subject matter of the claims was commonly owned at the time of invention.

8-9. Responsive to the Examiner’s rejection of Claims 13, 14, and 28 under 35 U.S.C. §102(b) or, in the alternative, under 35 §U.S.C 103(a) as obvious over U.S. 5,533,540 (Stanasolovich, et al.), Applicants respectfully disagree.

It would be clear to one skilled in the art that the upper surface of the transducers in Fig. 1 of Stanasolovich, et al. is the surface facing the cleaning fluid. Regardless,

Applicants have amended Claim 13 to clarify that the upper surface is the surface that faces the cleaning fluid. Stanasolovich, et al. does not teach the shape of this surface and does not anticipate Claims 13, 14, and 28.

With respect to the obviousness rejection, the Examiner asserts that it would be obvious to provide transducers comparable with the lengths of conventional wafer holders, which are conventionally longer than the diameter of the wafer. However, the Examiner has not provided any evidence of this. In fact the conventional way to ensure the treatment of all wafers is to use several transducers arranged in an array, not to use a single transducer that is the same length as the wafer holder. This is evidenced by the cited references—particularly in the Handbook of Semiconductor Wafer Cleaning Technology, which states that “[i]n megasonic systems, the energy is produced by an array of piezoelectric crystals or transducers.” It is hindsight to use only the Applicants’ teaching to make a determination that it would be obvious to use a transducer with the claimed shape in combination with the apparatus shown in the prior art.

Since Stanasolovich, et al. does not teach all the limitations of Claims 13 and 27 and it is not obvious to use a transducer having a long edge and a short edge simply because of the length of the wafer holder, Applicants respectfully submit that Claims 13, 14, and 27 are in condition for allowance.

10. Responsive to the Examiner’s rejection of Claims 13, 14, and 27 – 29 under 35 U.S.C. 103(a) as being unpatentable over U.S. 6,085,764 (Kobayashi, et al.) in view of Handbook of Semiconductor Wafer Cleaning Technology (HSWCT), Applicants respectfully disagree. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Neither Kobayashi, et al. nor the HSWCT teaches moving the wafers in relation to the shape of the transducer. The Examiner asserts that it would be obvious to an ordinary artisan to use a transducer with any suitable proportions and dimensions. Applicants submit, however, that the shape of the transducer is significant because the transducer having a surface with a long edge and a short edge facing the cleaning fluid creates a column of megasonic waves, and the motion of the wafers through these waves

is transverse to the column of waves (i.e., parallel to the short side of the cross-section of the column). This unique configuration and motion avoids placing any part of the wafers permanently in a stagnant zone (see paragraph [0025] of the published application, document number US 2002/0038662 A1). The claim limitations use structural language describing a transducer that creates the desired columns of megasonic waves.

Thus it would not be obvious to use the claimed shape of the transducer with the claimed direction of motion with the combined Kobayashi, et al. and the HSWCT. Applicants respectfully submit that Claims 13, 14, and 27 -- 29 are therefore in condition for allowance.

11. Responsive to the Examiner's rejection of Claims 13, 14, and 27-29 under 35 U.S.C. §103(a) as being unpatentable over U.S. 4,118,649 (Shwartzman, et al.) in view of U.S. 6,085,764 (Kobayashi, et al.), Applicants respectively disagree. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

The combination of Shwartzman, et al. and Kobayashi, et al. does not teach the motion of the wafers as parallel to a short edge of the surface of the transducer that faces the cleaning fluid regardless of whether the transducer is located on the side or the bottom of the tank. In contrast, the claims require that each transducer have "an upper surface with a long edge and a short edge, the upper surface facing the cleaning fluid or being substantially parallel with the most proximate boundary of the cleaning fluid," and that the wafers are moved "parallel to the short edge of the upper surface of the piezoelectric transducer."

Thus, Shwartzman, et al. and Kobayashi, et al. do not teach or suggest all the limitations of Claims 13, 14, and 27-29. Applicants therefore respectfully submit that Claims 13, 14, and 27-29 are in condition for allowance.

#### **Response to Arguments**

12. Applicants submit that the above remarks fully address the Examiner's rejections. With regard to the Mayer and Schwartzman references, Applicants strongly disagree that the documents clearly teach the claimed steps. '869 teaches only circular

transducers so the surfaces facing the cleaning fluid do not have a long edge and a short edge. Even assuming *arguendo* that the thickness of the transducer has a short edge and a long edge, the motion of the wafers in '869 is parallel to the long edge, not the short edge as required in the claims. '649 teaches circular and hexagonal transducers and neither version has a long edge and a short edge on a surface facing the cleaning fluid. Considering *arguendo* the thickness of the a surface of the hexagonal transducers 34 in '649, which does not face the cleaning fluid, the motion of the wafers is parallel to the long edge and perpendicular to the short edge.

### **Conclusion**

Applicants appreciate the opportunity to call the Examiner but believe that this amendment to the claims and the forgoing remarks fully address the issues raised by the Examiner. On the other hand, the Examiner is invited to call the undersigned if he has any matters to address that will facilitate allowance of the application.

In the event that Applicant has overlooked the need for an extension of time, additional extension of time, payment of fee, or additional payment of fee, Applicants hereby conditionally petition therefore and authorize that any changes be made to Deposit Account No.: 50-3010.

Applicants respectfully request favorable consideration and the timely issuance of a Notice of Allowance in this case.

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Respectfully submitted,  
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